Tutorial Short Description for AAAI-18 conference *-- version of Jan. 15, 2018*

Title: "Rulelog: Highly Expressive Semantic Rules with Scalable Deep Reasoning Networks"

Presenters: Benjamin Grosof (Accenture), Michael Kifer (Stony Brook University), Paul Fodor (Stony Brook University), and Janine Bloomfield (Coherent Knowledge); benjamin.n.grosof@accenture.com, kifer@cs.stonybrook.edu, pfodor@cs.stonybrook.edu, janine.bloomfield@coherentknowledge.com (see also bios/webpages below).

Duration: half-day (3.5 hours, excluding 30-minute break).

Description:

We cover the fundamental concepts, key technologies, emerging applications, recent progress, and outstanding research issues in Rulelog, a leading approach to deep, fully semantic, logical/probabilistic knowledge representation and reasoning (KRR) for AI and cognitive computing. Rulelog combines tightly with natural language processing (NLP) to both interpret and generate English, and complements machine learning (ML). It interoperates and composes well with graph databases, relational databases, spreadsheets, XML, and expressively simpler rule/ontology systems – and can orchestrate overall hybrid KRR. Developed over the last 25 years, Rulelog is *much* more feature-full than the previous state-of-the-art practical KRR approaches, yet is computationally affordable. It has capable efficient implementations including Ergo from Coherent Knowledge (free for academic use), and a large subset is in draft as an industry standard. Rulelog extends Datalog (database logic) with higher-order/meta syntax, flexible defeasibility and probabilistic uncertainty, general classical-logic-like formulas (including existentials and disjunctions), and restraint bounded rationality that ensures worst-case polynomial time for query answering. We illustrate Rulelog's wide applications for deep reasoning and representing complex knowledge – such as policies, regulations/contracts, science, and terminology mappings – including in financial services, accounting, health care, education, privacy, and e-commerce.

Background assumed of participants is only the basics of first-order-logic and relational databases.

Presenters' Bios:

Benjamin Grosof (http://benjamingrosof.com), a Principal Director and Research Fellow in AI at Accenture, is an industry leader in AI knowledge representation, reasoning, and acquisition. He was formerly IBM Research scientist, MIT Sloan professor, RuleML co-founder, senior program manager at the Allen Institute for AI's predecessor, and co-founder/CEO of Coherent Knowledge.

Michael Kifer (http://www.cs.stonybrook.edu/~kifer) is a Stony Brook University computer science Professor and co-founder/CTO of Coherent Knowledge, a semantic KRR technology startup. He co-invented F-logic, HiLog, and Transaction Logic, among the most widely cited works in computer science, with three prestigious "Test of Time" awards in database management and logic programming.

Paul Fodor (http://www.cs.stonybrook.edu/~pfodor) is a Research Assistant Professor in computer science at Stony Brook University, co-founder/Senior Engineer at Coherent Knowledge, and former member of the IBM Watson Jeopardy! Research team, with over 10 years experience in AI KRR, databases research, natural language processing, and stream processing systems.

Janine Bloomfield (http://coherentknowledge.com; http://www.linkedin.com/in/janinebloomfield) is co-founder/COO of Coherent Knowledge with over 4 years experience in developing Rulelog applications and tutorial materials. A Yale University PhD in ecosystems ecology, she was formerly senior scientist, on global climate change, at Environmental Defense Fund doing science communications at national and international level.